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ABSTRACT

This document provides information for the complete classification of members of the phylum Arthropoda. Both major and minor insect orders are discussed relative to their anatomical characteristics and importance. (CS)

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Principles of Insect Identification

MP 20

COLLEGE OF AGRICULTURE
AGRICULTURAL EXTENSION SERVICE
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PRINCIPLES OF INSECT IDENTIFICATION

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III - A. PRINCIPLES OF INSECT IDENTIFICATION

The identification of any animal (out of far more than 1 million different species) is expedited by separation of the entire Animal Kingdom into smaller groups. Each such group is called a Phylum and its members have certain features in common. Thus, all one-celled animals are placed in one Phylum, the Protozoa, and all animals with backbones belong to the Phylum Chordata. Between these two extremes are 25 other phyla, each of which contains a group of animals with several basic similarities and which are different from all the others.

The approximately 1 million different arthropods are separated into large groups by using major differences in structure. Functional and ecological differences are also considered. Such subdivisions of the arthropods are called Classes. Separation of Classes is based upon (1) number of pairs of antennae, (2) number of pairs of legs, and (3) body regions. These characteristics in combination divide the arthropods into the following common Classes: Arachnida, Chilopoda, Crustacea, Diplopoda, and Hexapoda (=Insecta). (See table III-A-1 for characteristics and common members of each Class).

An arthropod Class may be further subdivided into groups called Orders by again utilizing differences in basic structure. Orders, in turn, are separated into Families, each having certain features common to their members, but different from members of other Families. Each Family can be divided into still smaller groups, by again using structural differences, aided by functional and ecological differences. Each division of a Family is called Genus, and is composed of one or more individuals, called species, which differ from all other species. Subdivision of the species into subspecies, varieties, and races is possible in many cases, but is not necessary for users of this manual.

The complete classification of an insect thus includes the following, placing it in each category according to structure: (1) Kindgom - Animal; (2) Phylum - Arthropoda; (3) Class - Insecta; (4) Order - Orthoptera; (5) Family - Blattidae; (6) Genus - Blattella; (7) Species - germanica. The genus and species names written together (i.e., Blattella germanica) constitute the Scientific Name of a given insect species, thereby linking the actual animal and its man-made name. This makes possible unmistakable reference to a given animal, or to information concerning that animal, at any time or place.

A second method of referring to a given insect is by Common Name. Many common names are widely known and convey the same meaning in any locality (i.e., house fly, alfalfa weevil). Some common names, however, are not standardized and their use may lead to confusion and misidentification. Although common names are most desirable for use in contacts with the general public, extreme care must be excerised for accuracy of meaning.

Summary of Identifying Characteristics

Phylum Arthropoda: Jointed appendages, exoskeleton, bilateral symmetry, tubular digestive system, ventral nervous system.

Table III-A-1, Classes of Arthropods

CLASS	No. of Antennae	No. of Legs	Body Regions	Common Names of Types
Arachnida	None	4 pairs	2: cephalothorax abdomen	Spiders, mites, ticks, scorpions, solpugids, daddy longlegs
Chilopoda	1 pr	1 pr/seg.	2: head, body	Centipedes
Crustacea	2 prs	5 or more prs	2: cephalothorax, abodmen or head and body; 3: head, thorax, abdomen	Shrimp, crayfish, sowbug
Diplopoda	1 pr	2 pr/seg.	2: head and body	Millipedes
Insecta (Hexapoda)	1 pr	3 pr	3: head, thorax, abdomen	Insects: silverfish, crickets, beetles, bees, flies, moths, cockroaches, termites

Table III - A - 2. Summary of Major Insect Orders

ORDER	COMMON NAMES	IMPORTANCE Hmfl*	IMPORTANCE Bfnl*	IMPORTANCE Stage	MOUTHPARTS	OTHER FEATURES
ANOPLURA	Sucking lice; head lice, body lice; cattle lice	XXX		Adult, nymphs	Piercing-sucking	Head narrow; body wider; very flat; wingless; legs with claw-clamps
COLEOPTERA	Lady beetle, tiger beetle		xx	Adult, larva	Chewing	2 prs wings; front pr forms cover over abdomen, meet in straight line down middle of back; most hard bodied, some soft
	Flour beetles, dermestids	XXX				
	Grubworms, rootworms	XXX				
	Alfalfa weevil, grain weevils	XXX				
DERMAPTERA	Earwigs	XX		Adult, nymph	Chewing	2 prs wings, front pr leathery, meet in straight line down middle of back; "forceps" on end of abdomen
DIPTERA	Flies; mosquitoes, gnats	XXX		Adult, larva	Piercing-sucking; Sponging	1 pr wings, membranous or scaley; halteres in place of 2nd pr of wings
	Blackfly, horsefly	XXX				
	Root maggot, seed maggots	XXX				
	Tachina fly, robber fly		xxx			
HEMIPTERA	Chinch bugs, plant bugs	XXX		Adult, nymph	Piercing-sucking	Wingless or 2 prs wings; front pr half leathery, half membranous, all laid flat on top of body; beak on lower front of head
	Stink bugs, squash bugs	XXX	x			
	Bed bugs, kissing bugs	XXX				
	Boxelder bug, grass bugs	XXX				
	Damsel bugs, pirate bugs		xxx			
HOMOPTERA	Aphids; mealy bugs; tree hoppers, leaf hoppers, scale insects, spittle bugs	XXX		Adult, nymph	Piercing-sucking	Wingless or 2 prs wings; front pr membranous or leathery, back pr membranous, all held tent-like; beak on lower rear of head
		XXX				
		XXX				
HYMENOPTERA	Ants, wasps, sawflies	XXX		Adult, larva	Chewing; Chewing-lapping	2 prs membranous wings or wingless; hind wings smaller; "waist" between thorax and abdomen; many sting
	Bees	X	xxx			
	Parasitic wasps		xxx			

* Harmful or beneficial, respectively

Table III - A - 2. Summary of Major Insect Orders (Con't)

ORDER	COMMON NAMES	IMPORTANCE Hmful*	IMPORTANCE Bnfl*	Stage	MOUTHPARTS	OTHER FEATURES
ISOPTERA	Termites, white ants	XXX		Adult, nymph	Chewing	Wingless or 2 prs membranous wings, held flat over back; no "waist" between thorax-abdomen; workers white, swarmers black
LEPIDOPTERA	Butterflies, moths	X	x	Adult, larva	Siphoning (ad.)**	2 prs wings; wings, body covered with scales; adult mouthparts a long tube coiled under head
	Cutworms, armyworms	XXX			Chewing(l***)	
	Webworms, clothes moth	XXX				
MALLOPHAGA	Bird lice, chewing lice	XXX		Adult, nymph	Chewing	Wingless; small to tiny; head wide, blunt; body narrower than head
ORTHOPTERA	Grasshoppers, crickets, cockroaches, katydids	XXX		Adult, nymph	Chewing	Wingless or two prs; front pair narrow, leathery; back pair membranous, folded fan-like
	praying mantids	XXX	xx			
SIPHONAPTERA	Fleas	XXX		Adult	Piercing-sucking	Wingless; flattened side-to-side; spinose; leathery; jump; small to minute; brown or black
THYSANOPTERA	Thrips	XXX		Adult, nymph	Rasping-sucking; cone-shaped	Wingless or 2 prs narrow wings with fringe of long hairs; head blunt; antennae stout; tiny to minute
THYSANURA	Silverfish, firebrat	XXX		Adult, young	Chewing	Wingless; body flattened or tubular; 3 tails at end of abdomen

* Harmful or beneficial, respectively
** Adult
*** Larva

Table III - A - 3. Summary of Minor Insect Orders

ORDER	COMMON NAMES	IMPORTANCE Hmful*	Bnful*	Stage	MOUTHPARTS	OTHER FEATURES
COLLEMBOLA	Springtails	X		Adult, young	Chewing	Minute; white or gray; jump when disturbed
CORRODENTIA (Psocoptera)	Psocids, book lice	XX		Adult, nymph	Chewing	Minute; wingless or winged; wings membranous, held tent-like over body; "neck" behind head
EPHEMEROPTERA (Ephemerida)	Mayflies		xx	Adult, naiad	Vestigial (ad.)	2 pr wings, transparent, held upright; 2 tails on abdomen; soft-bodied
MECOPTERA	Scorpionflies		x	Adult, larva	Chewing	2 prs membranous wings, longer than body; head beak-like
NEUROPTERA	Lacewings, aphid lions, ant lions, dobson flies		xxx	Adult, larva	Chewing (ad.)	2 prs membranous wings, held tent-like; wing veins hairy
ODONATA	Dragonflies, damselflies, snake doctors, darners		xxx	Adult, naiad	Chewing	2 prs membranous wings, held out flat or up, on edge; bodies usually long and slender
PLECOPTERA	Stoneflies		x	Adult, naiad	Chewing	2 prs membranous wings, hind pair folded under; 2 tails on abdomen; soft bodied
TRICHOPTERA	Caddisflies		x	Adult, larva	Chewing	2 prs membranous wings, lightly covered with hair, held tent-like; body soft and hairy

* Harmful or beneficial, respectively

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